

ELD6501A Laser diode module whole APC inside

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■General description

ELD6501A is a laser diode module including all parts inside a small TO-56 metal can package. 650nm 5mW laser chip, a monitor diode and an APC drive circuit are all in the package. Only one resistor is necessary to define output power.

The TO-56 package of ELD6501A enables laser systems smaller and lighter. Also the built-in APC circuit saves development time and cost, and the sealed metal can package improves reliability. In addition, ELD6501A is robust over ESD because the sensitive laser chip is protected.

■Features

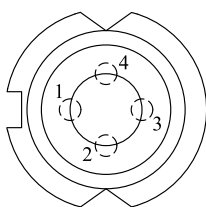
- Center wavelength : 650 nm
- Rated output : 5mW
- Operating voltage : 4V to 12V
- Operating current : 20mA (at 5mW rating)
- Overcurrent protection : 120mA
- Overheat protection : 125°C
- Laser output setting resistance : 1000kΩ to 10kΩ
- Modulation input (ON/OFF) terminal : Max.1MHz operation (Vin<0.3V OFF, Vin=Open/>2.0V ON)
- Small airtight sealing package : TO-56 (4 pins)

■Maximum absolute ratings

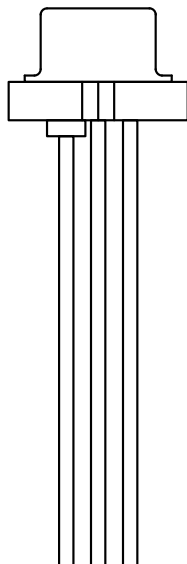
Parameter	Symbol	Conditions	Min.	Max.	Unit
Power-supply voltage	Vcc	Voltage between VCC and GND	-0.3	15.0	V
Input terminal voltage	Vin		GND-0.3	Vcc+0.3	V
Operating temperature range	Tc	Case temperature	-10	+70	°C
Storage temperature range	Tstg		-40	+85	°C

■Pin configuration

TOP VIEW



SIDE VIEW



Pin No.	Pin Name	Pin description
1	GND	Ground terminal case connection
2	IREF	Optical output setting pin
3	VCC	Power pin
4	MOD	ON/OFF modulation input pin

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■Electrical and optical properties

Ta=25°C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
Current consumption	I _{cc}	V _{cc} =5V, P _o =5mW	-	-	25.0	mA	
Operating voltage range	V _{cc}		4	-	12	V	
IREF pin voltage	V _{iref}		1.20	1.25	1.30	V	
IREF pin Current	I _{ref}	P _o =5mW or less	1	-	100	μA	
MOD pin high level	V _{ihm}		2	-	-	V	
MOD pin Low level	V _{ilm}		-	-	0.3	V	
MOD pin input frequency	F _{rqm}	V _{cc} =5V, 50%duty	DC	-	1	MHz	
Threshold current	I _{th} *	P _o =5mW	-	11	15	mA	
Operating current	I _{op} *	P _o =5mW	-	17	22	mA	
Operating voltage	V _{op} *	P _o =5mW	-	2.2	2.5	Volts	
Slope efficiency	η *	P _o =1.25 to 3.75mW	0.5	0.8	-	mW/mA	
Beam divergence (FWHM)	Parallel	θ _∥ *	P _o =5mW	5	8	12	angle
	Perpendicular	θ _⊥ *	P _o =5mW	30	36	42	angle
Lasing wavelength	λ	P _o =5mW	640	650	665	nm	

* θ_∥ and θ_⊥ are defined as the angle within which the intensity is 50% of the peak value.

* Measuring conditions : Pulse width=5μs, Duty cycle=1%.

■Operation

1. APC (Automatic power control) and MOD functions

ELD6501A operates in a wide VCC supply voltage from 4V to 12V. A laser diode (LD), a monitor diode (MD) and an automatic power control (APC) circuit inside the module work on stable laser output. The laser output power is proportional to the current from IREF terminal to GND, so you can adjust the laser output power by varying the IREF current. The APC circuit operates to keep laser output power being stable against power supply voltage and ambient temperature fluctuations.

The IREF terminal voltage is regulated at constant 1.25V by an internal voltage reference. The constant reference current can flow into the fixed resistor connecting to GND. The monitor diode (MD) is optically coupled to the LD chip. The photo current of MD is proportional to the laser output power. The laser drive current is controlled by making the MD photo current follows to the IREF source current. So the monitor photo current is always constant. Consequently the laser output power becomes stable. This is the way of stabilization by the APC circuit. It is possible to change the target laser power by selecting an external resistor value determining the current from IREF terminal to GND.

MOD terminal has the function of turning on/off LD output by the external logic signal. The MOD terminal is pulled down to GND internally. And when the terminal is open, it becomes Low and LD output goes ON. In case the MOD terminal is connected to GND the LD output also can be turned on. And the LD output will be turned off when the MOD terminal is set to a voltage of 2V or higher.

2. Protect function

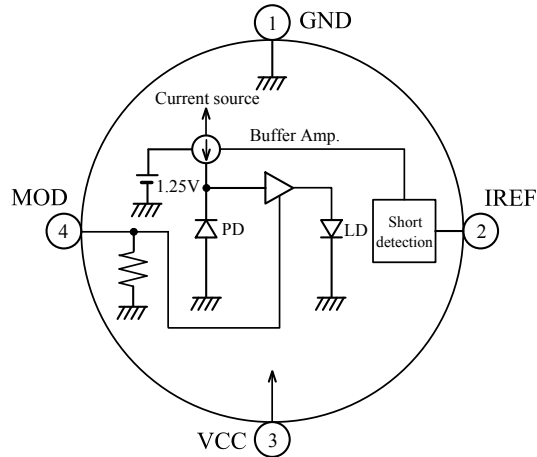
The LD protecting circuit limits the LD maximum drive current at 120 mA. And the over-temperature protection circuit can turn off the LD drive at 125°C or above.

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Internal configuration diagram

Inside of TO-56 package, there are two chips, one is an APC-driver IC chip integrated with a monitor diode and the other is a laser diode chip. These are arranged to be optically combined. The each chips' terminals are connected by bonding wires. Laser light is emitted through the upper glass window of TO-56 package. The laser emission center is positioned to be the centre of the glass window.



Usage

ELD6501A consist of all of laser and laser driving devices. It is easy to use, no need to design a drive circuit.

• VCC pin

Connect the VCC to a positive power supply. Connect a capacitor more than 0.1 μ F between VCC and GND.

• MOD pin

Keep open or connect to GND for continuous operation. 2V or more voltage is required at MOD terminal to stop the laser output. The MOD function operates on and off till 1MHz.

• IREF pin

IREF is used to define the laser output power. The IREF terminal outputs an internal reference voltage of 1.25V. Connect a resistor to the IREF terminal, The resistor current depending on the resistance determines the laser power. Laser output power is also adjusted by connecting a constant current load to the IREF terminal instead of a resistor. Due to the variations at individual components, it is necessary to adjust the IREF resistance value or the constant current value connected to the IREF to obtain the target laser power. After a target laser power is obtained, fix the resistance or the current value. Normally, the IREF terminal current at 5mW output power is less than 100 μ A.

Safety and reliability precautions

Laser light is emitted from this product. Please handle it with great care during operation. Do not look into the laser light without protection glasses.

ESD

A laser product is sensitive to electrostatic. Proper measures are required for preventing electrostatic discharge.

Heat sink

All power consumption is changed to heat excepting energy emitted as a laser. The effective heat sink design is required to avoid exceeding the maximum operating temperature.

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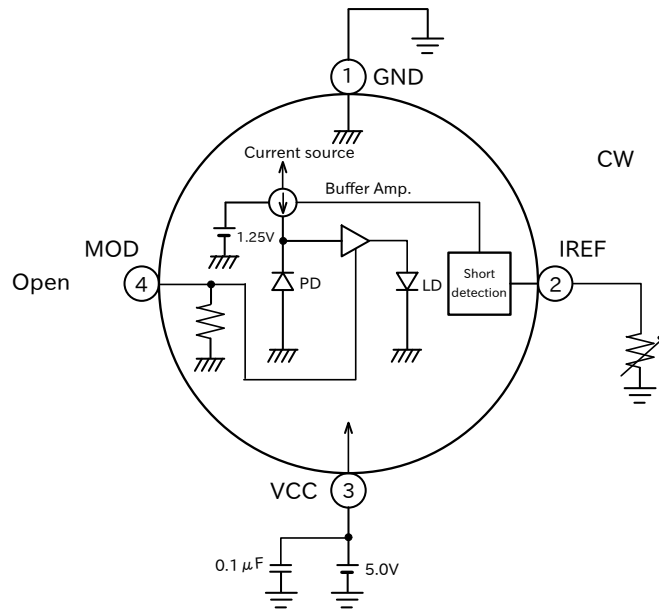
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■Application circuit examples

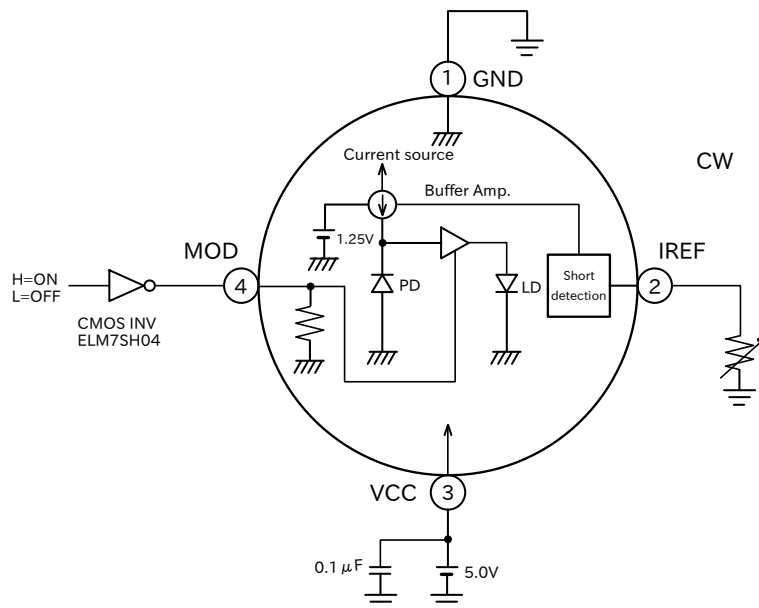
The following circuit 1 is a continuous light emitting application circuit. MOD terminal is open. The IREF terminal resistor define the laser power. If the resistance value is high, the output will be small, and if it is smaller the output will be larger. Adjust the resistance value from large to small so that the laser diode is not destroyed by excessive current.

An circuit 2 is an application circuit that turns on/off a laser output by an external logic signal. Connect a CMOS logic gate to MOD terminal and turn laser on/off with a logic output.

circuit 1



circuit 2



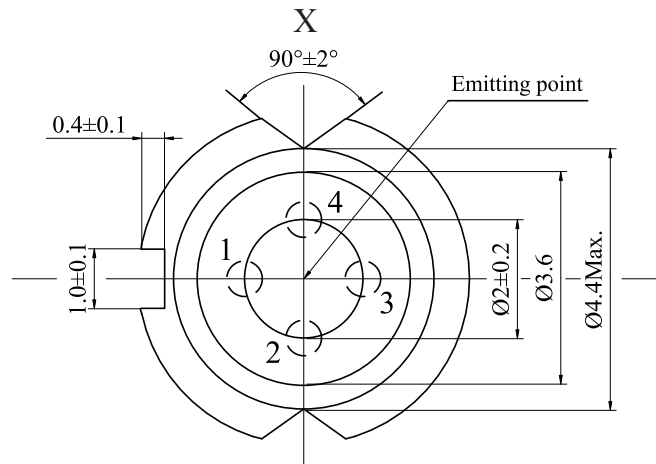
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External dimensions

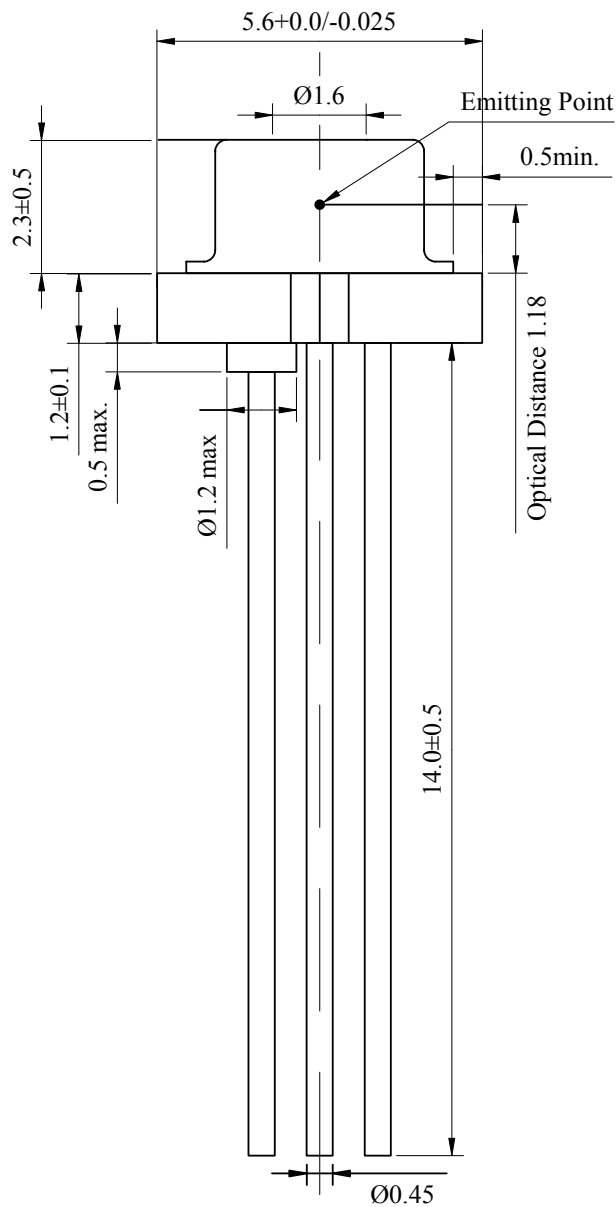
TOP VIEW

Y



SIDE VIEW

Z



Unit: mm